

WHAT IS CLAIMED IS:

1. A slot array antenna, comprising:  
a power feeding waveguide for feeding  
microwave power; and

5 a plurality of rectangular radiating  
waveguides connected to a plurality of windows which are  
disposed along the longitudinal direction of the power  
feeding waveguide, so as to guide the microwave power  
from the plurality of windows to the outside of the  
10 antenna;

wherein each of the radiating waveguides  
has a plurality of slots disposed along the longitudinal  
direction of the radiating waveguide; and the interval  
"d" between the centers of gravity of slot pairs or slots  
15 is substantially the same as the wavelength  $\lambda_m$  of the  
microwave in the rectangular radiating waveguide.

2. A slot array antenna according to claim 1,  
wherein the interval "d" between the centers of gravity  
of slot pairs or slots is in the range of  $0.75 \leq \lambda_m \leq$   
20  $1.25$ , with respect to the wavelength  $\lambda_m$  of the microwave.

3. A slot array antenna according to claim 1 or 2,  
wherein the dielectric constant of a dielectric material  
disposed in the radiating waveguide is 1 or more.

4. A slot array antenna according to any one of  
25 claims 1 to 3, wherein the power feeding waveguide is a  
rectangular waveguide.

5. A slot array antenna according to any one of  
claims 1 to 4, wherein traveling wave is to be generated  
in the radiating waveguide.

30 6. A slot array antenna according to any one of  
claims 1 to 5, wherein a matching slot is disposed at the  
terminal end of the radiating waveguide.

7. A slot array antenna according to any one of  
claims 1 to 6, wherein the slots formed on one side of  
35 the radiating waveguide are disposed such that they are  
gradually deviated from the center axis in the

longitudinal direction of the radiating waveguide.

8. A slot array antenna according to any one of claims 1 to 7, wherein the slots provided on one side of the radiating waveguide are such that they form an inclination angle of  $45^\circ$  relative to the center axis in the longitudinal direction of the radiating waveguide.

9. A slot array antenna according to any one of claims 1 to 8, wherein a slit having a variable width is disposed at the power feeding portions for feeding power from the power feeding waveguide to the radiating waveguide.

10. A slot array antenna according to any one of claims 1 to 9, wherein the slots formed on one side of the radiating waveguide are selected from the group consisting of: slots perpendicular to the traveling direction of the electromagnetic field, slot pairs in the form of "staggered  $\lambda$ ", and slot pairs each of which is inclined at about  $45^\circ$  with respect to the traveling direction of the electromagnetic field.

11. A plasma processing apparatus comprising:

a plasma processing chamber for subjecting an object to be processed to a plasma treatment; and

antenna means for guiding microwave power into the plasma processing chamber so as to generate plasma in the plasma processing chamber;

wherein the antenna means comprises: a power feeding waveguide for feeding microwave power; and a plurality of rectangular radiating waveguides connected to a plurality of windows which are disposed along the longitudinal direction of the power feeding waveguide, so as to guide the microwave power from the plurality of windows to the outside of the antenna, wherein each of the radiating waveguides has a plurality of slots disposed along the longitudinal direction of the radiating waveguide; and the interval "d" between the centers of gravity of slot pairs or slots is

substantially the same as the wavelength  $\lambda_m$  of the microwave in the rectangular radiating waveguide.

12. A plasma processing apparatus according to claim 11, wherein the interval "d" between the centers of gravity of slot pairs or slots is in the range of  $0.75 \leq \lambda_m \leq 1.25$ , with respect to the wavelength  $\lambda_m$  of the microwave.